QUANTIC

The UK Quantum Technology Hub
in Quantum Enhanced Imaging

Ultra-low noise imaging

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University of BRISTOL

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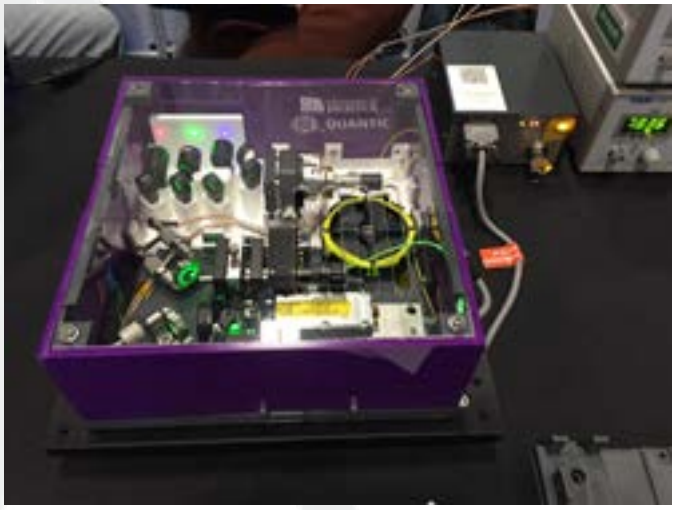
Our twin-beam light source takes advantage of the inherent correlations present in nonlinear optical processes to deliver intensity-noise-supressed measurements at high optical powers, with wavelengths tailored to the requirements of biological imaging.

QuantIC researchers at the University of Bristol have developed a light source which harnesses nonlinear photon interactions in specially designed optical fibre to generate bright, visible-wavelength red and blue beams that are correlated in intensity and spectrum. This approach can suppress optical intensity noise below the classical shot-noise limit in order to reach the ultimate level of precision allowed by quantum mechanics, therefore enabling ultra-precise measurements at optical powers that compete with the performance of laser sensors.

This system is designed to be both simple to use and highly stable, and differs significantly from existing commercial quantum light sources in both operating wavelengths and light intensity. Novel light sources of this kind will be essential quantum photonic components in a range of future applications including enhanced biomedical imaging and precision sensing of light-sensitive samples.



Wavelengths of generated twin beams: Near 450 nm and 650 nm

Average generated power:
Up to 100 μW (nanosecond pulsed)

Device size:
250 x 250 x 100 mm

Latest publications:
Sub-Poissonian Twin-Beam Correlations at Blue and Red Wavelengths from Four-Wave Mixing, J. Mueller et al., 2018 Conference on Lasers and Electro-Optics (CLEO), pp. 1-2 (2018)

A practical model of twin-beam experiments for sub-shot-noise absorption measurements, J. Mueller, N. Samantaray, J. Matthews, Appl. Phys. Lett. 117, 034001 (2020)

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